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ABSTRACT

This paper describes the development, validation, and use of a research instrument, the College and University Classroom Environment Inventory (CUCEI), designed to assess the environment of small higher education classrooms. The instrument evaluates students' or instructors' perceptions of the following seven psychosocial dimensions of actual or preferred classroom environment: personalization, involvement, student cohesiveness, satisfaction, task orientation, innovation, and individualization. Administration of the CUCEI to 372 students in 34 classes and to 20 instructors attested to the internal consistency reliability and discriminant validity of the actual and preferred forms with either the individual or the class mean as the unit of analysis, and supported the ability of the actual form to differentiate between the perceptions of students in different classrooms. A research application of the CUCEI involving associations between student outcomes and classroom environment tentatively suggested that the nature of the classroom environment affects outcomes. Another research application suggested that both students and instructors preferred a more favorable classroom environment than the one actually present, and that instructors viewed classroom environments more positively than did their students in the same classrooms. Desirable future applications of the CUCEI for research purposes and in improving teaching in higher education are considered. A copy of the inventory and a three-page list of references are included in the appendix. (JAZ)

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VALIDATION AND APPLICATION OF THE COLLEGE AND UNIVERSITY CLASSROOM ENVIRONMENT INVENTORY (CUCEI)

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ABSTRACT

A strong tradition in research in primary and secondary schools has involved student and teacher perceptions of psychosocial characteristics of actual or preferred classroom environment. This paper provides a foundation for the extension of this tradition to the higher education level by describing the development, validation, and use of a new instrument, the College and University Classroom Environment Inventory (CUCEI), suitable for small higher education classes often referred to as seminars. The CUCEI assesses students' or instructors' perceptions of the following seven psychosocial dimensions of actual or preferred classroom environment: personalization, involvement, student cohesiveness, satisfaction, task orientation, innovation, and individualization. Administration of the CUCEI to 372 students in 34 classes and to 20 instructors attested to the internal consistency reliability and discriminant validity of the actual and preferred forms with either the individual or the class mean as the unit of analysis, and supported the ability of the actual form to differentiate between the perceptions of students in different classrooms. A research application of the CUCEI involving associations between student outcomes and classroom environment tentatively suggested that the nature of the classroom environment affects outcomes. Another research application suggested that both students and instructors preferred a more favorable classroom environment than the one actually present, and that instructors viewed classroom environments more positively than did their students in the same classrooms. Desirable future applications of the CUCEI for research purposes and in improving teaching in higher education are considered.

The first main aim of this paper is to describe the development and validation of a new instrument to assess perceptions of classroom psychosocial environment in university and college classrooms. The second major purpose is to report the first two research uses of this instrument in, respectively, a study of associations between student outcomes and classroom environment and an investigation of differences between students and instructors in their perceptions of actual and preferred classroom environment. As well, desirable future research directions involving the new instrument are suggested. Before describing the development and use of the new instrument for the higher education level, important background information about analogous work at the primary and secondary school levels is briefly reviewed in an attempt to place the new work into context.

ANALOGOUS PAST RESEARCH IN SCHOOLS

Over the past two decades, considerable interest has been shown internationally in the conceptualization, measurement, and investigation of perceptions of psychosocial characteristics of the learning environment of primary and secondary schools. Classroom environment is now firmly established as an active field of study through recent key publications including several books (Moos, 1979; Walberg, 1979; Fraser, 1986a), monographs (Fraser, 1981b; Fraser & Fisher, 1983a), a meta-analysis (Haertel et al., 1981), several reviews (Walberg, 1976; Walberg & Haertel, 1980; Fraser, 1981a, 1985; Fraser & Walberg, 1981; Chavez, 1984), and a guest-edited journal issue (Fraser, 1980).

The use of student perceptions can be contrasted with two other major approaches for assessing and studying classroom environment. One approach involves direct observation and systematic coding of classroom communication and events according to some category system (Dunkin & Biddle, 1974). In contrast to methods which rely on outside observers, the approach described here defines classroom environment in terms of the shared perceptions of the students and sometimes the teachers in that environment. This has the dual advantage of characterizing the class through the eyes of the actual participants and capturing data which the observer could miss or consider unimportant. Students are at a good vantage point to make judgments about classrooms because they have encountered many different learning environments and have enough time in a class to form accurate impressions. Also, even if teachers are inconsistent in their day-to-day behavior, they usually project a consistent image of the long-standing attributes of classroom environment.

The three instruments used most extensively in prior research at the secondary school level are the Learning Environment Inventory (Anderson & Walberg, 1974; Fraser, Anderson & Walberg, 1982), the Classroom Environment Scale (Trickett & Moos, 1973; Moos & Trickett, 1984), and the Individualized Classroom Environment Questionnaire (Rentoul & Fraser, 1979; Fraser, 1986c). The My Class Inventory (Fisher & Fraser, 1981; Fraser, Anderson & Walberg, 1982), a simplified version of the Learning Environment Inventory, has been used in numerous studies at the primary and junior high school levels. Also all of these instruments except the Learning Environment Inventory are now available in economical short forms (Fraser, 1982a). Typical scales included in the above instruments are Competition, Formality, Difficulty, Rule Clarity, Personalization, and Investigation.

Another feature of most of the classroom environment instruments described above is that they have four distinct forms which measure (a) student perceptions of actual classroom environment, (b) student perceptions of preferred classroom environment, (c) teacher perceptions of actual classroom environment, and (d) teacher perceptions of preferred classroom environment. The preferred forms are concerned with goals and value orientations and measure perceptions of the classroom environment ideally liked or preferred. Having these four different forms has enabled classroom environment scales to be used for a range of research and practical applications.

Classroom environment instruments have been used as sources of predictor and criterion variables in a variety of research studies conducted in primary and secondary schools. Use of student perceptions of actual classroom environment as predictor variables in several different countries has established consistent relationships between the nature of the classroom environment and various student cognitive and affective outcomes (see Haertel et al., 1981). Studies involving use of the actual form of classroom environment scales as criterion variables have revealed that classroom psychosocial climate varies between different types of schools, between classes of different sizes, and between classes following different subject matter; also both researchers and teachers have found it useful to employ classroom climate dimensions as process criteria of effectiveness in curriculum evaluation because they have differentiated revealingly between alternative curricula when student outcome measures have not (see review of Fraser, 1985). Other studies have incorporated both the actual and preferred forms of classroom environment instruments in comparisons of students' and teachers' perceptions of actual and preferred classroom environment (Fraser, 1982b) and in person-environment fit studies of whether students achieve better in their preferred classroom environment (Fraser & Fisher, 1983c). As well, teachers have used assessments of their students' perceptions of their actual and preferred classroom environment as a basis for identification and discussion of actual-preferred discrepancies, followed by a systematic attempt to improve classrooms (Fisher & Fraser, 1986).

Despite the existence of this strong tradition of classroom environment research at the primary and secondary school levels, surprisingly little analogous work has been conducted at the tertiary level. Although some notable work has focused on the institutional or school-level environment of universities and colleges (e.g., Pace & Stern, 1958; Halpin & Croft, 1963; Stern, 1970), classroom-level studies are conspicuously absent. One likely explanation for this simply is the unavailability of suitable, reliable, and practical instruments for use in tertiary classrooms. Consequently, this study aimed to develop an instrument for measuring student or instructor perceptions of either actual or preferred environment in small tertiary classes often referred to as seminars or tutorials (as distinct from lectures or laboratory classes). This new instrument - called the College and University Classroom Environment Inventory (CUCEI) - is discussed in the next section.

INITIAL DEVELOPMENT OF CUCEI

The initial development of the College and University Classroom Environment Inventory was guided by the following four criteria:

1. Consistency with Secondary-School Instruments. Guidance in identifying dimensions was obtained by examining all dimensions contained in existing instruments for the secondary-school level.

2. Coverage of Moos's General Categories. Dimensions chosen provided coverage of the three general categories of dimensions identified by Moos (1974) for conceptualizing all human environments. These three general categories are Relationship Dimensions (the nature and intensity of personal relationships), Personal Development Dimensions (basic directions along which personal growth and self-enhancement tend to occur), and System Maintenance and System Change Dimensions (extent to which the environment is orderly, clear in expectation, maintains control, and is responsive to change). Since Moos claims that, at minimum, Relationship Dimensions, Personal Development Dimensions, and System Maintenance and System Change Dimensions must be assessed to provide an adequate and reasonably complete picture of any environment, dimensions for the CUCEI were chosen to include at least one scale in each of Moos's three general categories.

3. Salience to Tertiary Teachers and Students. By interviewing a number of tertiary teachers and students and asking them to comment on draft versions of sets of items, an attempt was made to ensure that the CUCEI's dimensions and individual items were considered salient by teachers and students.

4. Economy. In order to achieve economy in answering and processing, the CUCEI was designed to have a relatively small number of reliable scales, each containing a fairly small number of items.

It was found that the above criteria could be satisfied with an instrument containing the following seven scales: Personalization, Involvement, Student Cohesiveness, Satisfaction, Task Orientation, Innovation, and Individualization. By writing new items and rewriting existing ones, scales selected from secondary school inventories were redefined and modified to make them well-suited to small higher education classes (e.g., seminars and tutorials). The set of items passed through several successive revisions based on reactions solicited from colleagues with expertise in questionnaire construction and teaching at the higher education level. Careful attention was paid to making each item suitable for measuring either actual or preferred classroom environment.

The resulting preliminary version of the CUCEI contained 12 items per scale. Both the actual and preferred forms were field tested with a sample of 127 students in 10 classes following several different courses at one multi-purpose tertiary institution in Perth, Western Australia (see Fraser et al., 1984). Both undergraduate and postgraduate classes were involved. Data were subjected to item analysis in order to identify items whose removal would enhance each scale's internal consistency (the extent to which items in the same scale measure the same dimensions) and discriminant validity (the extent to which a scale measures a unique

dimension not covered by the other scales in the instrument). In particular, scale internal consistency was improved by removing items with low item-remainder correlations (i.e., correlations between a certain item and the rest of the scale excluding that item), while discriminant validity was enhanced by removing any item whose correlation with its a priori assigned scale was lower than its correlation with any of the other six scales in the CUCEI. These procedures led to a version of the CUCEI which contained seven items per scale.

The final version of the CUCEI contains 49 items altogether, with an equal number of items belonging to each of the seven scales. Each item is responded to on a four-point scale with the alternatives of Strongly Agree, Agree, Disagree, and Strongly Disagree. The scoring direction is reversed for approximately half of the items. Table I clarifies the meaning of each CUCEI scale (which has a common-sense meaning) by providing its classification according to Moos's scheme, a scale description, and a sample item. The items listed in Table I are from the actual form of the CUCEI, but the wording of the preferred form is almost identical except for the use of words such as "would". For example, the item "The instructor goes out of his/her way to help students" in the actual form is reworded in the preferred form to read "The instructor would go out of his/her way to help students".

A complete copy of the CUCEI is included in Appendix A. Items in Appendix A are arranged in cyclic order so that the first, second, third, fourth, fifth, sixth, and seventh item, respectively, in each block measures Personalization, Involvement, Student Cohesiveness, Satisfaction, Task Orientation, Innovation, and Individualization. Items whose item numbers are underlined are scored 1, 2, 4, and 5, respectively, for the responses Strongly Agree, Agree, Disagree, and Strongly Disagree. All other items are scored in the reverse manner. Omitted or invalidly answered items are scored 3.

VALIDATION OF CUCEI

Some preliminary validation data for the actual and preferred forms of the CUCEI were reported previously by Fraser et al. (1984) for the sample of 127 students in 10 classes involved in field testing. But, because the improvements in scale statistics gained through application of item analysis techniques can be lost in subsequent administrations of an instrument because of sampling variations, it is important to crossvalidate the refined forms of instruments to check that reliability and other indexes hold up. In the case of the CUCEI, crossvalidation data are now available for a larger and more diverse sample of students, as well as for a sample of instructors. The student sample consisted of a total of 372 people made up of, first, 307 students in 30 postgraduate and undergraduate classes in a variety of disciplines (including education, biology, mathematics, communications, and psychology) in two multi-purpose higher education institutions in Perth, Western Australia and, second, 65 postgraduate and undergraduate students in four education classes in a university in Illinois, USA. The group of instructors consisted of a subsample of 20 of the 30 different teachers (16 Australian and 4 American) teaching these 34 classes.

TABLE I
Descriptive Information for each Scale in CUCEI

Scale Name	Moos Category	Scale Description	Sample Item
Personalization	R	Emphasis on opportunities for individual students to interact with the instructor and on concern for students' personal welfare	The instructor goes out of his/her way to help students. (+)
Involvement	R	Extent to which students participate actively and attentively in class discussions and activities	The instructor dominates class discussions. (-)
Student Cohesiveness	R	Extent to which students know, help and are friendly toward each other	Students in this class get to know each other well.(+)
Satisfaction	R	Extent of enjoyment of classes	Classes are boring. (-)
Task Orientation	P	Extent to which class activities are clear and well organized	Students know exactly what has to be done in our class. (+)
Innovation	S	Extent to which the instructor plans new, unusual class activities, teaching techniques, and assignments	New and different ways of teaching are seldom used in this class. (-)
Individualization	S	Extent to which students are allowed to make decisions and are treated differentially according to ability, interest, of rate of working	Students are allowed to choose activities and how they will work. (+)

R: Relationship Dimension, P: Personal Development Dimension, S: System Maintenance and System Change Dimension.

Items designated (+) are scored 5,4,2, and 1 respectively, for the responses Strongly Agree, Agree, Disagree, and Strongly Disagree. Items designated (-) are scored in the reverse manner. Omitted or invalid responses are scored 3.

The first index of validity reported is scale reliability (see Table II). Estimates of the internal consistency of the actual and preferred forms of each CUCEI scale were calculated using Cronbach's alpha coefficient. Data are reported separately for the four different forms (namely, student actual, student preferred, instructor actual, and instructor preferred) using the individual as the unit of analysis. Also, because the class mean has been used commonly as the unit of analysis in past classroom environment research, alpha reliability estimates also are reported for class means for the group of 34 classes. Class estimates of internal consistency were made simply by using the variance of class means on each item in conjunction with the conventional alpha formula.

Table II shows that, for the four forms of the instrument, the values obtained for the alpha coefficient ranged from 0.53 to 0.90 with the individual as the unit of analysis and from 0.78 to 0.96 with the class as the unit of analysis. The reliabilities for class means generally are notably high and, as expected, are larger than those for individuals. These data together suggest that each CUCEI scale has adequate internal consistency, especially for scales containing only seven items each, in both its actual and preferred forms, for both students and instructors, and with either the individual or the class mean as the unit of analysis.

Table II also reports data about discriminant validity (using the mean correlation of a scale with the other six scales as a convenient index) for each of the four forms of the CUCEI using both the individual and the class as the unit of analysis. Generally these values are small enough to suggest that each CUCEI scale has adequate discriminant validity for use in its actual and preferred forms, with students and instructors, and for two units of analysis. It appears that the CUCEI measures distinct although somewhat overlapping aspects of classroom environment; but, the conceptual distinctions among scales are important enough to retain the seven dimensions within the instrument.

Another desirable characteristic of the student actual form of any classroom environment instrument is that it is capable of differentiating between the perceptions of students in different classrooms. That is, students within the same class should perceive it relatively similarly, while mean within-class perceptions should vary from classroom to classroom. This characteristic was explored for each scale of the student actual form of the CUCEI using the same sample of 372 students in 34 classes. This involved performing for each scale a one-way ANOVA, with class membership as the main effect and using the individual as the unit of analysis. The results of these analyses are shown in Table II which indicates that each scale differentiated significantly ($p<0.001$) between classrooms. The eta^2 statistic, which is the ratio of between to total sums of squares, was calculated as an estimate of the amount of variance in CUCEI scores attributable to class membership. This table shows that the proportion of variance accounted for by class membership ranged from 0.32 for Satisfaction to 0.47 for Student Cohesiveness.

ASSOCIATIONS BETWEEN STUDENT OUTCOMES AND CLASSROOM ENVIRONMENT

The strongest tradition in past classroom environment research has involved investigation of associations between students' cognitive and

TABLE II
Internal Consistency Reliability (Alpha Coefficient) and Discriminant Validity (Mean Correlation with Other Six Scales) for Two Units of Analysis and ANOVA Results for Class Membership Differences

Scale	Unit of Analysis	Alpha Reliability				Mean Correlation with Other Scales				ANOVA Results	
		Student actual	Student pref.	Instr. actual	Instr. pref.	Student actual	Student pref.	Instr. actual	Instr. pref.	Student actual F	Student actual Eta^2
Personal-ization	Indiv.	0.75	0.68	0.60	0.67	0.46	0.42	0.28	0.32	5.5*	0.35
	Class	0.85	0.81			0.53	0.50				
Involvement	Indiv.	0.70	0.65	0.54	0.76	0.47	0.41	0.34	0.44	6.9*	0.40
	Class	0.81	0.79			0.56	0.55				
Student Cohesiveness	Indiv.	0.90	0.78	0.83	0.70	0.45	0.39	0.29	0.38	9.2*	0.47
	Class	0.95	0.90			0.48	0.44				
Satisfaction	Indiv.	0.88	0.82	0.53	0.82	0.45	0.40	0.14	0.25	4.7*	0.32
	Class	0.96	0.90			0.53	0.57				
Task Orient-ation	Indiv.	0.75	0.63	0.74	0.77	0.38	0.33	0.40	0.26	7.6*	0.43
	Class	0.85	0.78			0.41	0.38				
Innovation	Indiv.	0.81	0.70	0.55	0.55	0.46	0.41	0.24	0.15	7.1*	0.41
	Class	0.93	0.82			0.53	0.50				
Individualiz-ation	Indiv.	0.78	0.67	0.83	0.82	0.34	0.32	0.35	0.25	8.9*	0.46
	Class	0.89	0.80			0.36	0.36				

*p<0.001

affective learning outcomes and their perceptions of psychosocial characteristics of their classrooms (Haertel et al., 1981). Numerous research programs have shown that student perceptions account for appreciable amounts of variance in learning outcomes, often beyond that attributable to background student characteristics. The practical implication from this research is that student outcomes might be improved by creating classroom environments found empirically to be conducive to learning.

A notable feature of the set of approximately 50 studies of outcome-environment associations reviewed by Fraser (1985d) for the secondary and elementary school levels is that findings have been replicated in numerous different countries. In fact, links between students' outcomes and the nature of the classroom psychosocial environment have emerged in studies in the USA (Walberg, 1972), Canada (Walberg & Anderson, 1972), Australia (Fraser & Fisher, 1982), Israel (Hofstein et al., 1979), India (Walberg et al., 1977), Indonesia (Fraser, Pearse & Azmi, 1982), Thailand (Fraser, 1986b), and The Netherlands (Wierstra, 1984).

The findings from prior research are highlighted in the results of an ambitious meta-analysis involving 734 correlations from a collection of 12 studies of 10 data sets from 823 classes in eight subject areas containing 17,805 students in four nations (Haertel et al., 1981). Learning posttest scores and regression-adjusted gains were found to be consistently and strongly associated with cognitive and affective learning outcomes, although correlations were generally higher in samples of older students and in studies employing collectivities such as classes and schools (in contrast to individual students) as the units of statistical analysis. In particular, better achievement on a variety of outcome measures was consistently found in classes perceived as having greater cohesiveness, satisfaction, and goal direction and less disorganization and friction.

In contrast to the impressive number of studies at the school level, research into associations between outcomes and the nature of the classroom psychosocial environment in higher education has hardly begun. In an isolated study in higher education, Genn (1975) attempted to link satisfaction among 137 Diploma in Education students at one university with their perceptions of faculty press as assessed by an adaptation of Pace and Stern's (1958) College Characteristics Index. In particular, it was found that satisfaction was higher where the faculty was perceived to be characterized by more humanism, welfare, and scientism and less practicality.

In the present study, associations between higher education classroom environment and student outcomes were explored for the previously described sample of 34 classes (30 Australian and 4 American) for two separate outcome measures. First, because one of the CUCEI's scales is Satisfaction, use of this dimension as a dependent variable provided some useful information about what other aspects of classroom environment tend to be linked with student satisfaction within the class. Second, all students in the sample responded to a Locus of Control measure (Paulus & Christie, 1981) which assesses personal efficacy among students. This construct was assessed with Paulus and Christie's

instrument containing 10 items with seven response alternatives. For the present sample of 372 students, the alpha reliability of this Locus of Control measure was 0.61, which is comparable to the reliability reported recently for this measure by Tobin and Gallagher (1985).

Associations between the two outcomes measures (Satisfaction and Locus of Control) and the other six classroom climate dimensions measured by the CUCEI were investigated using both the univariate and multivariate statistical tests reported in Table III. In all analyses, the class mean (N=34) was used as the unit of statistical analysis because this satisfied the requirement of independence of observations in the present context in which the intact class was the primary sampling unit. The univariate statistic reported in Table III is the simple correlation between each outcome and each environment scale. Because of correlations among classroom climate variables, multiple regression analysis was used to provide a multivariate test of the joint influence of the set of six environment variables on the outcomes and of the unique contribution to outcome variance made by each individual climate scale.

The results of the simple correlational analyses reported in Table III are that significant univariate associations emerged between Satisfaction and all six environment variables and between Locus of Control and the two environment variables of Student Cohesiveness and Task Orientation. The interpretation of these correlations is that classroom Satisfaction was higher in classes characterized by greater Personalization, Involvement, Student Cohesiveness, Task Orientation, Innovation, and Individualization, whereas Locus of Control scores were higher in classes perceived to have more emphasis on Student Cohesiveness and Task Orientation.

The results of the multivariate tests (i.e., multiple regression analyses) reported in Table III show that the multiple correlation between an outcome measure and the set of six environment scales was 0.86 for Satisfaction (74% of variance accounted for) and 0.59 for Locus of Control (35% of variance accounted for). These amounts of variance were statistically significant only for the Satisfaction outcome for the present sample size of 34 classes.

The beta weights (i.e., the standardized regression weights) in Table III provide an estimate of the influence of any specific environment variable on an outcome when the remaining five environment variables are held constant. In other words, the climate variables whose regression weights are significantly different from zero are those which account for a significant increment in outcome variance over and above that attributable to the other five environment variables combined. Table III shows that, with other climate variables fixed, classroom Satisfaction was significantly greater in more cohesive and task oriented classes. On the other hand, none of the environment scales uniquely explained a significant amount of the variance in Locus of Control scores.

Of course, further research is needed before too much confidence is placed in the specific results of this study. It would be desirable to replicate the research with other samples and outcome measures and to incorporate provision for statistical control for student background characteristics (e.g., ability, beginning-of-year performance) when

TABLE III
Univariate and Multivariate Associations Between Outcomes and Classroom Environment Dimensions

Scale	Association with Outcome			
	Satisfaction		Locus of Control	
	r	beta	r	beta
Personalization	0.60**	-0.22	-0.22	0.24
Involvement	0.78**	0.53*	0.13	0.17
Student Cohesiveness	0.58**	0.08	0.40*	0.43
Task Orientation	0.59**	0.42**	0.48**	0.37
Innovation	0.72**	0.12	0.13	-0.43
Individualization	0.46**	0.16	-0.09	-0.14
Multiple Correlation:	0.86**		0.59	

*p<0.05 **p<0.01

Sample size was 34 class means.

estimating the strength of outcome-environment associations. Furthermore, because the data are correlational, of course causality cannot be inferred. Nevertheless, these preliminary findings of associations between student outcomes and the nature of the psychosocial environment of higher education classrooms are still important because they replicate considerable prior research at the elementary and secondary school levels.

DIFFERENCES BETWEEN STUDENTS' AND INSTRUCTORS' PERCEPTIONS OF ACTUAL AND PREFERRED ENVIRONMENT

A research application made possible by the availability of the CUCEI in four different forms is the investigation of discrepancies between the environment perceived as being actually present in classrooms and that preferred by students and instructors, and of differences between students and their teachers in their perceptions of the same actual classroom environment. This involved the sample of 20 instructors described previously together with the 20 classes taught by these instructors. As Figure 1 illustrates, data consisted of 20 teachers'scores on the actual and preferred forms of the CUCEI and the corresponding 20 class means of both the actual and preferred perception scores of the students in the classes of these instructors.

Figure 1 shows simplified plots of statistically significant differences between forms. The first stage in the construction of these profiles was the performance of a one-way repeated measures MANOVA for the four-level variable representing the form of the CUCEI (student actual, student preferred, instructor actual, instructor preferred). The multivariate test using Wilk's lambda criterion revealed a significant difference ($p < 0.05$) among the four forms. To interpret the significant findings for the four-level form factor, a series of t tests for dependent samples (using the conventional 0.05 level of confidence) was used to test pairwise comparisons between the different forms. (This approach was adopted with the present limited sample size of 20 classes because it seemed to combine the good power characteristics of individual t tests with the protection against overall Type I error afforded by the requirement that the overall F should meet the 0.05 significance criterion; with larger samples, Tukey's or Newman Keul's tests would be preferred.) In an attempt to provide a more parsimonious picture of differences between forms, only statistically significant differences are plotted in Figure 1. Consequently, any nonsignificant difference is represented by a zero difference by averaging the relevant pair of scores.

Of course some variation among classes existed in profiles of student actual, student preferred, instructor actual, and instructor preferred scores. Nonetheless, a remarkable similarity was evident in the profiles for different classes, so that Figure 1 still provides a useful and accurate guide to the shape of the profiles in the majority of the 20 classrooms.

The interpretation of the results in Figure 1 for the comparison of student actual and student preferred forms is that students preferred a more favorable classroom environment than they perceived as being actually present on six of the seven dimensions assessed by the CUCEI. In fact students preferred greater Involvement, Student Cohesiveness,

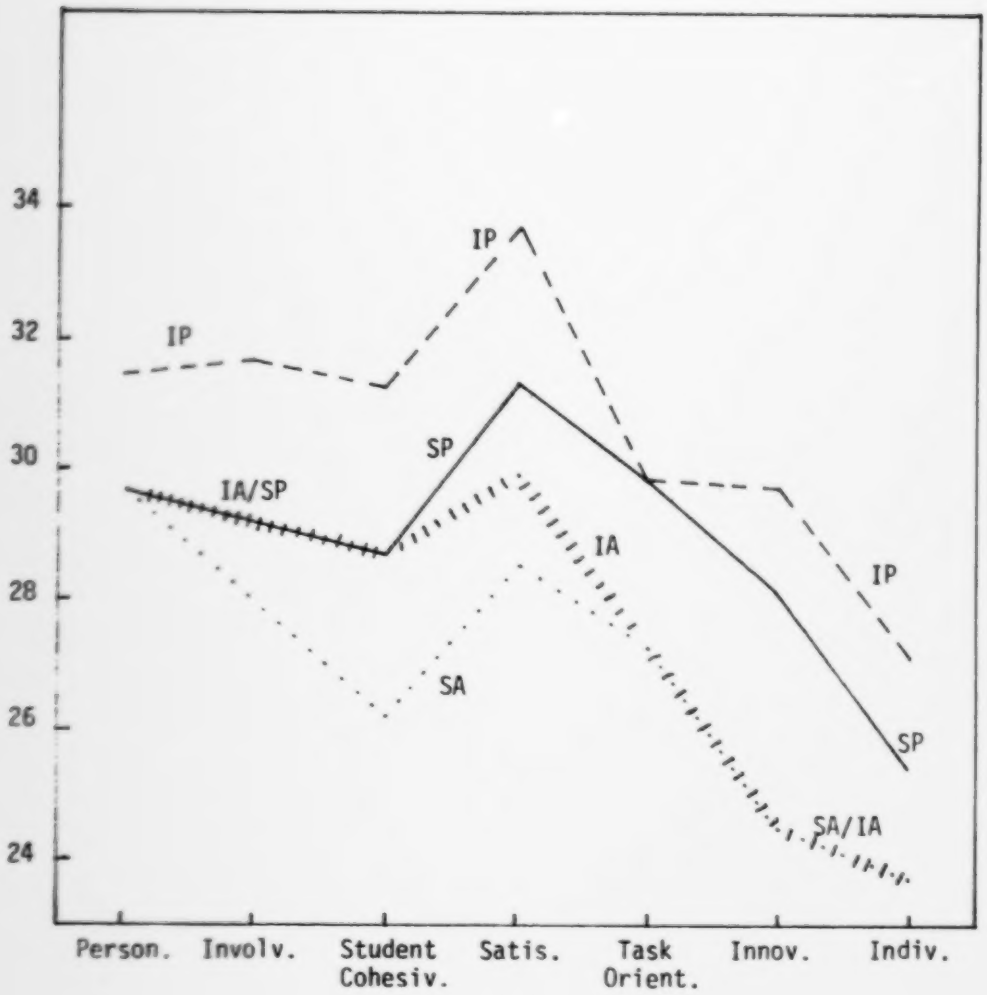

Fig. 1. Significant Differences Between Student Actual (SA), Student Preferred (SP), Instructor Actual (IA), and Instructor Preferred (IP) on the CUCEI

Satisfaction, Task Orientation, Innovation, and Individualization; on the other hand, the level of Personalization perceived by students as actually present was not significantly different from the level preferred by students. Examination of the profiles of instructor actual and instructor preferred scores in Figure 1 indiciates that, in comparison with the classroom environment perceived as being actually present, instructors would prefer more emphasis on all seven environment dimensions assessed by the CUCEI. A comparison of student actual and instructor actual profiles suggests that instructors perceived more Involvement, Student Cohesiveness, and Satisfaction in the classroom environment than did their students in the same classes.

Clearly two patterns of findings emerge from this research using the CUCEI. First, in comparison with the emphasis they perceived as being actually present, both students and instructors tended to prefer a more positive environment in terms of most of the scales assessed. Second, instructors perceived their classes more favorably on several environment scales than did their students in the same classrooms. It is noteworthy that these results in higher education classrooms replicate prior research in secondary school classrooms in both the USA (Moos, 1979) and Australia (Fraser, 1982b; Fisher & Fraser, 1983) and in elementary school classes in Australia (Fraser, 1984). The present findings are practically important because they inform educators in higher education that students and instructors are likely to differ in the way that they perceive the actual environment of the same classrooms, and that the environment preferred by students and instructors commonly differs from that actually present in classrooms.

CONCLUSION

This paper describes the development and validation of a new instrument, the College and University Classroom Environment Inventory (CUCEI), which assesses seven dimensions of the actual and preferred environment of small higher education classrooms. Comprehensive validation information reported herein tentatively attests to the internal consistency reliability and discriminant validity of the actual and preferred forms of the CUCEI for use with either the individual or the class mean as the unit of analysis, and supports the ability of the actual form to differentiate between the perceptions of students in different classrooms.

The two research applications of the CUCEI reported in this article are an investigation of associations between student outcomes and the nature of the classroom environment and a study of differences between students and instructors in their perceptions of actual and preferred classroom environment. These preliminary findings are promising because they replicate considerable previous research at the primary and secondary school levels. One of these studies provided some evidence that the nature of the classroom environment affects students' outcomes. The other study suggested that, first, both students and instructors preferred a more favorable classroom environment than the one actually present and, second, instructors viewed classroom environments more favorably than did their students in the same classrooms.

Although the first two research applications of the CUCEI described above are promising, there is considerable scope to replicate and extend this work and pursue several other lines of research previously completed successfully in schools. As already noted, it would be desirable to replicate the study of the effects of classroom environment on student outcomes using other samples, a variety of outcomes, and methodological refinements (e.g., statistical control for student ability or beginning-of-course achievement). Similarly, it would be interesting to replicate the study of differences between student and instructor perceptions of actual and preferred environment with other larger samples.

Another particularly promising use of classroom environment instruments is as a source of process criteria in the evaluation of teaching methods or curriculum innovations (Walberg, 1975; Fraser, 1981b). Evaluation in higher education could benefit from less reliance on standard achievement criteria and more attention to socio-psychological classroom processes as valuable ends in their own right. Moreover, a number of evaluation studies at the secondary school level have clearly demonstrated that classroom environment measures can differentiate revealingly between alternative teaching approaches or curricula, even when a variety of student outcome measures show little sensitivity (Anderson et al., 1969; Fraser, 1979; Levin, 1980).

There is likely to be benefit in replicating in higher education settings several of the interesting studies at the secondary school level involving classroom environment dimensions as dependent variables. This comprehensive set of studies has investigated whether classroom environment is influenced by important factors such as class size (Walberg, 1969), gender of the teacher (Lawrenz & Welch, 1983), the subject being studied (Kuert, 1979), and teacher control ideology (Harty & Hassan, 1983).

Whereas past research in schools has concentrated on investigations of associations between student outcomes and the nature of the actual environment, having both actual and preferred forms of instruments permits exploration of whether students achieve better when there is a higher similarity between the actual classroom environment and that preferred by students. In fact, recent studies have extended research in a new direction by using a person-environment fit framework in classroom environment research (Fraser & Fisher, 1983b, c). This research revealed that student outcomes depended, not only on the nature of the actual classroom environment, but also on the match between students' preferences and the actual environment. The benefits of replicating this line of research in higher education are that it could suggest ways of improving student outcomes through a better match of actual classrooms with student preferences.

Although much research has been conducted on student perceptions of classroom learning environment, surprisingly little has been done to help educators improve the environments of classrooms. But feedback information based on student perceptions can be employed as a basis for reflection upon, discussion of, and systematic attempts to improve classroom environments. The basic logic underlying the approach involves, first, using assessments of student perceptions of both their actual and preferred classroom environment to identify discrepancies

between the actual classroom environment and that preferred by students and, second, implementing strategies aimed at reducing existing discrepancies. The proposed methods have been applied successfully previously at the secondary school level (Fraser, Seddon & Eagleson, 1982), the primary school level (Fraser & Deer, 1983), and at the higher education level (DeYoung, 1977).

Appendix A

COLLEGE AND UNIVERSITY CLASSROOM ENVIRONMENT INVENTORY (CUCEI)

ACTUAL FORM

Directions

The purpose of this questionnaire is to find out your opinions about the class you are attending right now.

This questionnaire is designed for use in gathering opinions about small classes at universities or colleges (sometimes referred to as seminars or tutorials). It is not suitable for the rating of lectures or laboratory classes.

This form of the questionnaire assesses your opinion about what this class is actually like. Indicate your opinion about each questionnaire statement by circling :

SA	if you STRONGLY AGREE	that it describes what this class is actually like.
A	if you AGREE	that it describes what this class is actually like.
D	if you DISAGREE	that it describes what this class is actually like.
SD	if you STRONGLY DISAGREE	that it describes what this class is actually like.

All responses should be given on the separate Response Sheet.

1. The instructor considers students' feelings.
2. The instructor talks rather than listens.
3. The class is made up of individuals who don't know each other well.
4. The students look forward to coming to classes.
5. Students know exactly what has to be done in our class.
6. New ideas are seldom tried out in this class.
7. All students in the class are expected to do the same work, in the same way and in the same time.

8. The instructor talks individually with students.
9. Students put effort into what they do in classes.
10. Each student knows the other members of the class by their first names.
11. Students are dissatisfied with what is done in the class.
12. Getting a certain amount of work done is important in this class.
13. New and different ways of teaching are seldom used in this class.
14. Students are generally allowed to work at their own pace.

15. The instructor goes out of his/her way to help students.
16. Students "clockwatch" in this class.
17. Friendships are made among students in this class.
18. After the class, the students have a sense of satisfaction.
19. The group often gets sidetracked instead of sticking to the point.
20. The instructor thinks up innovative activities for students to do.
21. Students have a say in how class time is spent.

22. The instructor helps each student who is having trouble with the work.
23. Students in this class pay attention to what others are saying.
24. Students don't have much chance to get to know each other in this class.
25. Classes are a waste of time.
26. This is a disorganized class.
27. Teaching approaches in this class are characterized by innovation and variety.
28. Students are allowed to choose activities and how they will work.

29. The instructor seldom moves around the classroom to talk with students.
30. Students seldom present their work to the class.
31. It takes a long time to get to know everybody by his/her first name in this class.
32. Classes are boring.
33. Class assignments are clear so everyone knows what to do.
34. The seating in this class is arranged in the same way each week.
35. Teaching approaches allow students to proceed at their own pace.

36. The instructor isn't interested in students' problems.
37. There are opportunities for students to express opinions in this class.
38. Students in this class get to know each other well.
39. Students enjoy going to this class.
40. This class seldom starts on time.
41. The instructor often thinks of unusual class activities.
42. There is little opportunity for a student to pursue his/her particular interest in this class.

43. The instructor is unfriendly and inconsiderate towards students.
44. The instructor dominates class discussions.
45. Students in this class aren't very interested in getting to know other students.
46. Classes are interesting.
47. Activities in this class are clearly and carefully planned.
48. Students seem to do the same type of activities every class.
49. It is the instructor who decides what will be done in our class.

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